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INSTITUTE OF GAS TECHNOLOGY
AFFILIATED WITH ILLINOIS INSTITUTE OF TECHNOLOGY
CHICAGO 16, ILLINOIS

GAS ABSTRACTS

VOLUME 4
NUMBER 2

FEBRUARY
1948

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GAS ABSTRACTS is published and distributed monthly by the Institute of Gas Technology, Chicago 16, Illinois. The contents of selected papers and patents are reviewed impartially by the editorial staff and material of potential interest to the Gas Industry is presented. Subscription rates to non-members of the Institute: $15.00 per year.—Printed in the U.S.A.

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1. GAS INDUSTRY

Competitive Fuels

Ball, M. W. FUELS FOR TODAY AND TOMORROW. *Am. Gas Assoc. Monthly* **29**, 540, 573-574 (1947) *December.*

A discussion is given of the competitive position of gas, oil and coal, with oil perhaps largely eliminated as a future factor because of continued short supply. Proper relationship will not be reached by government regulation but must be established on the basis of supply and demand or gas reserves will diminish rapidly while coal remains unmined. This paper was presented at the Cleveland convention of the American Gas Association, October, 1947.

H. R. Batchelder

Extension of Gas Service

Pettyjohn, E. S. EXTENSION OF GAS SERVICE. *Am. Gas Assoc. Monthly* **29**, 563-565, 572-573 (1947) *December.*

The author emphasizes the fact that, although oil and gas reserves are a very small part of our fuel reserves, they are adequate to meet present needs for the next twenty to thirty years. Efforts to extend gas service should not slacken now because coal will be the main source of gaseous and liquid fuels at some time in the future. Methods are discussed for meeting the peak loads that a large house-heating market imposes, and the need for cooperation between the oil industry and the gas industry is stressed. This paper was presented at the Cleveland Convention of the AGA in October, 1947.

H. R. Batchelder

Gas Industry Review

Reed, H. W. GAS INDUSTRY FORGES AHEAD. *Am. Gas Assoc. Monthly* **30**, 3-6, 45-46 (1948) *January; Gas Age* **101**, 21-24, 68 (1948) *January* 8; *Gas Appliance Merchandising* **20**, 18-19 (1948) *January.*

A general review is given of the developments during 1947 in expansion of production and transmission capacities, manufacture and sale of appliances, extension of promotional, advertising and research activities and technical advances.

H. R. Batchelder

LP-Gas Legislation

Kreutzer, A. C. BUTANE-PROPANE LEGISLATION. *Butane-Propane News* **10**, 63-70, 72, 75 (1948) *January.*

LP-gas distributors are urged to familiarize themselves with pending state legislation involving their industry. Each piece of legislation should be examined to determine whether its purpose is to raise funds or to increase the safety of operations. Legislation proposed in 48 states during the past year is discussed.

E. F. Davis

LP-Gas Sales

Thomas, R. W. and Rugh, K. W. LP-GAS SALES GAIN 30%. *Oil Gas J.* **46**, 36, 38, 106 (1948) *January* 1; *Gas Age* **101**, 43-44, 68 (1948) *January* 8; *LP-Gas* **8**, 21-22, 48-50 (1948) *January; Gas* **24**, 33-35 (1947) *January; Am. Gas Assoc. Monthly* **30**, 11-13 (1948) *January.*

In this annual survey of the liquefied petroleum gas industry the authors make these points: (1) Sales of L.P.G. have more than doubled the

last 3 years but the market is far from satisfied. (2) Twenty per cent of all homes using gas are now served with L.P.G. (3) During 1947, domestic use of L.P.G. increased 31.8 per cent, industrial uses increased 11.6 per cent, utility use increased 55.8 per cent, and chemical uses increased 34.9 per cent. (4) Export of L.P.G., while a small portion of the total business, is growing rapidly. (5) Uniform L.P.G. safety standards are now in effect in 35 states. (6) Huge supplies of propane are available to expand the L.P.G. business but plants for recovery may cost as much as three times the cost of older plants. (7) Retail prices of L.P.G. are rising, due to higher costs.

Authors' abstract

Natural Gas Industry

Hendee, R. W. DYNAMIC GROWTH FEATURES NATURAL GAS INDUSTRY. *Gas Age* **101**, 27, 74 (1947) *January* 8.

Mr. Hendee has reviewed recent progress in the natural gas industry including expansion of older facilities as well as the appearance of new. He points out that the natural gas industry serves 9½ million customers while the manufactured gas industry serves 9 million and the LP-gas industry serves over 2 million. This represents a total population of about 100 million.

J. D. Parent

2. APPLIANCES

Aerated Burner Flames

Culshaw, G. W. and Garside, J. E. RECENT STUDIES OF AERATED BURNER FLAMES. *Gas World* (*British*) **127**, 854-857 (1947) *December* 13; *Gas Times (British)* **53**, 368, 370-372 (1947) *December* 19.

A comparison of the recent studies showing the relationship between flame velocity and burner operating characteristics is given. Results of various workers are of a conflicting nature and further research is suggested.

E. F. Davis

Appliance Demand

Robertshaw, J. A. MANUFACTURERS FACED WITH UPRECEDENTED DEMAND FOR APPLIANCES. *Gas Age* **101**, 25 (1948) *January* 8.

Statistics on the production and sales of gas appliances during 1947 are given.

E. F. Davis

Appliance Standards

Hense, H. J. FACT FINDING FOR SOUND STANDARDS. *Am. Gas Assoc. Monthly* **30**, 14-16 (1948) *January*.

Constant studies and investigations have helped to keep A.S.A. approval requirements for domestic appliances in step with advancing technology experience.

E. F. Davis

Burner Design

Minchin, L. T. PROBLEMS IN BURNER DESIGN FLAME BEHAVIOR. *Gas World (British)* **127**, 777-782 (1947) *November* 29; *Gas Times (British)* **53**, 377-378, 380 (1947) *December* 19.

A discussion of recent researches on the effect of flame velocity on flame behavior is given.

The author suggests that turbulence in gas-air mixing is a more important factor in explaining lifting and flashing.

E. F. Davis

Gas Floor Furnace

Eckles, J. D. INSTALLING THE GAS FLOOR FURNACE. *Gas Appliance Merchandising* **20**, 15-16, 33-36 (1948) *January*.

See *Gas Abstracts* 4, 2 (1948) *January* for abstract.

Heat Loss Calculations

Johnson, E. G. HOW TO CALCULATE HEAT LOSSES. *LP-Gas* **7**, 30-31, 50-52 (1947) *December*.

A short cut method for calculating heat losses from buildings is presented.

E. F. Davis

Launderettes

Wilson, H. B. GAS SALES POTENTIALS IN LAUNDERETTES. *Gas Age* **100**, 31, 50, 52 (1947) *December* 25.

A hot water reclaimer for launderettes which saves 30% in gas operating costs is discussed. Increased gas sales are expected with the public's acceptance of clothes driers and ironers.

E. F. Davis

Pin-Hole Burner Design

Jessel, R. and Hendley, H. R. FACTORS IN DESIGN OF PIN-HOLE GAS BURNERS. *Gas World* (*British*) **127**, 808-809 (1947) *December* 6; *Gas Times (British)* **53**, 376-377 (1947) *December* 19.

A discussion of the experimental set up and the measurement of flame radiation from pin-hole burners is given.

E. F. Davis

Radiant Heating

Klebes, J. H. RADIANT HEATING. *Gas Appliance Merchandising* **20**, 20-21 (1948) *January*.

A general discussion of a "home made" radiant floor panel heating system is given.

E. F. Davis

Radiation from Gas Fires

Morpurgo, P. W. R. and Silver, R. S. THE MEASUREMENT OF RADIATION FROM GAS FIRES. *Gas World* (*British*) **127**, 812-813 (1947) *December* 6.

Proposed changes in the standards for measuring radiation from gas flames are discussed.

E. F. Davis

Venting

Dean, C. H. PRINCIPLES OF PROPER VENTING. *LP-Gas* **8**, 29-30, 61-65 (1948) *January*.

At the present time most domestic gas appliances are far from being properly vented. A general procedure for exhausting flue products and for supplying combustion air is given.

E. F. Davis

Year-Round Air Conditioning

Smith, F. C. THE FIFTH BIG JOB IS ASKING TO BE DONE. *Gas* **23**, 25-28 (1947) *December.*

A discussion of the potentialities of year-round air conditioning for distributing the base load is given. All gas utilities are encouraged to exploit this market more fully.

E. F. Davis

The following article, which has not been abstracted, is called to your attention:

REVIEW OF APPLIANCE SALES DURING THE PAST YEAR AND THE OUTLOOK FOR 1948. *Am. Gas J.* **168**, 19 (1948) *January.*

3. COMBUSTION AND INDUSTRIAL FURNACES

Aeromatic Burner

THE NON-LIGHTING BACK BURNER IN PRACTICE. *Gas World "Industrial Gas" (British)* **127**, 147-149 (1947) *December* 20.

An appraisal of Aeromatic burners resulting from observation of their industrial application is given. The Aeromatic is an atmospheric tunnel burner with two inspirating ports but is not 100% aerated.

E. F. Davis

Coke Combustion

Hagerbaumer, W. A. and Lee, R. COMBUSTION OF COKE DEPOSIT ON SYNTHETIC-BEAD CRACKING CATALYST. *Trans. Am. Soc. Mech. Engrs.* **69**, 779-783 (1947) *October.*

Process variables are evaluated for the combustion of carbonaceous deposits contained upon TCC "bead" cracking catalyst. The effects of oxygen concentration, temperature and carbon distribution were determined in laboratory apparatus and the data were correlated graphically. The results were successfully applied in designing multizone kilns for commercial thermofor units. Because of the hydrogen content of the carbonaceous deposit and high partial pressure of steam, the initial zones are maintained below 1000°F whereas the final temperature is about 1150°F. A commercial kiln is described.

C. H. Riesz

Combustion

Townend, D. T. A. COMBUSTION. *Brit. Coal Util. Research Assoc. Monthly Bull.* **11**, 417-421 (1947) *October.*

Academic advances in the science of combustion during the recent years are reviewed in highly general terms and only limited literature references given. The work done on the evaluation of heats of combustion and formation of hydrocarbons under the supervision of F. D. Rossini at the National Bureau of Standards is given attention. The advances in the field of slow combustion are noted, especially the acceptance of the theory of chain reactions as basis of study of reaction rates and mechanisms. Developments in the investigation of the mechanism of combustion in flames are discussed and the practical applications of studies of atoms and free radicals in flame reactions stressed. The topics of burner stability and the burning of solids are also reviewed.

H. R. Linden

Furnace Lining Heat Losses

McCullough, J. D. HEAT LOSSES IN FURNACE LININGS. *Ind. Gas* **26**, 7-11, 29-30 (1948) *January.*

See *Gas Abstracts* **3**, 144 (1947) *September* for abstract.

Gas Turbine Power Plant

Christie, A. G. AN APPRAISAL OF THE GAS TURBINE FOR POWER PLANTS. *Combustion* **19**, 41-45 (1947) *November.*

The open, closed and semi-closed types of cycles are discussed. Ways of improving the cycle efficiency of the gas turbine are given as the following: (a) higher gas temperature to the turbine (limited to 1250°F. by metals presently available) (b) lower temperature of air intake to the compressor (undercooling by ammonia refrigeration has been proposed) (c) lower exhaust temperature (involving study in the design of heat exchangers) (d) modifications of the simple cycle by intercooling the air during compression and reheating the gases during expansion of the working fluid in the turbine (this has led to multi-cylinder two-shaft design in larger units). Based on 1250°F. gas temperature and with intercoolers, reheaters and large exhaust heat exchanger, the guarantees on larger units represent efficiencies of about 29 to 31% at full load, depending on inlet gas temperatures, and computed on the high heat value of the fuel. These are substantially the efficiencies of many of our best steam-turbine stations at the present time. Rotary gas turbines under construction are expected to compare favorably with diesel engines. Gas turbines can use natural gas, fuel oil or coal for fuel. The plant design of a gas turbine plant is relatively simple; the floor space requirements are not large and the required auxiliaries are few. In the author's opinion, developments in gas turbines have reached the point where economical and reliable units can be furnished. Manufacturers are swamped with orders for all lines of product so that, for large gas turbines, deliveries are no better than three to four years.

J. J. First

Gas Turbine Power Plant

1000-KW GAS TURBINE PLANT FEATURES NEW CENTRIFUGAL COMPRESSOR DESIGN. *Power* **91**, 851-853 (1947) *December.*

The author describes the experimental open-cycle unit built by Maschinenfabrik Oerlikon, Switzerland, which operated continuously for some 2000 hours. Design of the equipment permits operation as a single shaft or a 2-shaft machine with the hp turbine driving the compressor at 4500 rpm. The compressor, which develops 1:4 pressure ratio at rated output, is an intercooled 3-stage centrifugal compressor of unique design. Its performance, in terms of pressure and compression efficiency, was improved by increasing the number of diffusers (volutes), to four. A centrifugal compressor is used because of the following advantages: relatively flat pressure and volume characteristics, greater operating range before reaching the pumping limit and greater flexibility in intercooler installation. The fuel-injection system is reported to be designed for low-pressure operation needing only a few pounds excess pressure to inject fuel oil into the combustion chamber.

J. J. First

LP-Gas Aircraft

Grant, W. C. LOWER COSTS, BETTER PERFORMANCE SEEN IN LP-GAS FLIGHT. *LP-Gas* **7**, 26 (1947) *December.*

Successful aircraft test flights using propane as a fuel show large savings in fuel cost,

quicker throttle response, carbon elimination, elimination of engine oil dilution and a more even piston action.

E. F. Davis

Steel Mill Power

HOW GAS ENGINES SERVE TODAY'S STEEL MILLS. *Power* **92**, 102-104 (1948) *January.*

Comparison of gas engines to steam turbines for steel mill power generation reveal that the gas engines are somewhat more economical. Exhaust gas from the gas engines is fed through a waste heat boiler with a recovery of about 20%. Typical heat balances for a gas engine and boiler are given.

E. F. Davis

4. CARBONIZATION AND GASIFICATION

Benzole Extraction

Deringer, H. A STEAM-SAVING PROCESS FOR BENZOLE EXTRACTIONS. *Am. Gas J.* **168**, 22-23 (1948) *January.*

A very brief description is given of a Swiss process in which a hot inert gas is circulated in a closed system to remove adsorbed benzol from active carbon, after which the benzol is condensed from the gas. Steam savings of the order of two pounds per pound of benzol are claimed.

H. R. Batchelder

Combustion Characteristics of Town Gas

FINAL REPORT ON A SURVEY OF THE COMBUSTION CHARACTERISTICS OF TOWN GAS. *Gas World* (*British*) **127**, 765-768 (1947) *November* 29.

This article is a condensation of a report on the gas characteristics affecting the combustion and burning characteristics of town gas in contemporary gas burners.

E. F. Davis

Corrosion by Town Gas

Pyke, H. G. THE INFLUENCE OF AMMONIA AND HYDROCYANIC ACID ON THE CORROSION OF STEEL BY TOWN GAS. *Natl. Gas Bull.* (*Australia*) **11**, 20-21 (1947) *September-October.*

The presence of NH_3 and HCN in the saturated town gas, produced by the Australian Gas Light Company, and their effect upon the corrosion of steel was studied. Presence of NH_3 accelerated corrosion while HCN tended to protect the steel, probably due to the type of film it produces on the steel surface.

S. Mori

Gas Main Leakage

Portwood, H. D. DISCOVERY AND CONTROL OF LEAKAGE. *Gas Age* **100**, 18-19, 48 (1947) *December* 25.

This article gives an outline to be followed in discovering leaky gas mains before using the bar method which is time consuming and costly.

E. F. Davis

German Coal Research

Lowry, H. H. and Rose, H. J. SOME OBSERVATIONS ON GERMAN COAL RESEARCH AND DEVELOPMENTS. *U. S. Bureau Mines Information Circular 7422* (1947) *December.*

A description of the procedure for controlling research, allocation and distribution of solid fuels is given. The research and development work, when practical, is carried out with the participation of industry and is generally financed by those doing the work, the results of which, if expedient, are published in the technical press. Five fuel research laboratories, visited by the Solid Fuels Mission in 1945 are described. The financial subsidization, physical condition, equipment, and the research of the laboratories are given. Research in these laboratories are given. Research in these laboratories in 1945 was virtually at a standstill, a result of the war.

G. M. Platz

Oil Gas Manufacture

Grant, R. R. TESTING MANUFACTURE OF OIL GAS. *Am. Gas Assoc. Monthly* 29, 545- 549, 572 (1947) *December.*

An account is given of the work done in the Camden, New Jersey coke plant of the Public Service Electric and Gas Company from 1932 to 1934 on the production of oil gas in a by-product coke oven. The equipment used and the results obtained are described. In the preferred operation just under 200 M.c.f. of 1270 B.t.u. oil gas were produced per 24 hr. cycle at the yield of 69 cu. ft. of oil gas per gal. of oil and 370 M.c.f. of 128 B.t.u. producer gas. Tar amounted to 0.27 gal/gal oil and coke to 0.24 lbs/gal oil. Steaming the oven at the end of the oil runs reduced coke yield somewhat, but increased heat transfer through the oven walls.

H. R. Batchelder

Oxygen Plant

Hugill, J. T. TONNAGE OXYGEN FOR CHEMICAL INDUSTRY. *Can. Chem. Process Ind.* 13, 1115-1120 (1947) *December.*

A description of a typical Frankl low purity tonnage oxygen plant and discussion of the operation are given. Brief mention is made of the various potential uses of low-cost oxygen.

H. R. Batchelder

5. NATURAL GAS AND NATURAL GAS CONDENSATES

Booster Station

Mueller, A. V. COOLING WATER REQUIREMENTS FOR NATURAL GAS BOOSTER STATIONS. *Gas Age* 100, 32-33 (1947) *December* 25.

Equipment and operation of a natural gas booster station belonging to the Columbia Gas System and operated by the Ohio Fuel Gas Company, Ashland district, is described in this article. All water pumping is done by turbine pumps. Water for cooling the cylinders of the gas engines, cylinders of the compressor jacket and the gas leaving the first and second stages of the compressors is cooled in an induced draft, twin-compartment cooling tower of wooden construction 35 ft. high, 46 ft. long and 22 ft. wide. The water is pumped from a river, one-half mile away from the gas station to a pond and then to a concrete reservoir serving the cooling tower. The Ashland station produces between 26 and 38 million cu. ft. of gas per day. After leaving the plant under 98 lb. pressure at a maximum temperature of 85°F., moisture and gasoline are eliminated at the Pavonia station which has a drying plant.

J. J. First

Centrifugal Compressor

Karassik, I. J. PROCESS ENGINEER'S GUIDE TO THE CENTRIFUGAL COMPRESSOR—III. *Chem Eng.* **54**, 126-128 (1947) *December.*

The author recommends rating centrifugal compressors in terms of the head which can be developed under adiabatic conditions. The relation of this to equivalent air pressure is given.

J. D. Parent

Centrifugal Compressor

Reed, P. TEXAS EASTERN OPERATES FIRST HIGH-PRESSURE GAS-TRANSMISSION CENTRIFUGAL COMPRESSORS. *Oil Gas J.* **46**, 60-61, 130-131 (1948) *January* 22.

The program of increasing capacity involves five stations with reciprocating compressors totaling 36,000 HP and 16 stations with centrifugal compressors of 117,500 total HP. The first stage of installing three reciprocating and seven centrifugal stations will be completed soon, and two of the centrifugal stations have already been equipped. Claims are made that the new type of compressors are lower in initial cost, require less space and have only 10% as many parts. Certain details of design are presented. Compression ratio is 1.3 and electric drive is used. Motor specifications are 1,250 HP, 3.600 r.p.m., 2,300 volts and induction type.

J. D. Parent

Compressor Plant Design

Torrey, P. D. DESIGN AND CONSTRUCTION OF COMPRESSOR PLANTS. *Petroleum Engr.* **19**, 108, 111, 114, 116, 118, 120, 122, 124, 126 (1947) *December.*

This is a general discussion and includes such topics as required horse-power, sizing of pipe connections, cooling systems and foundations.

J. D. Parent

Condensate Production and Cycling

Jones, P. J. CONDENSATE PRODUCTION AND CYCLING. PART 12. *World Oil* **127**, 136, 139-140 (1947) *January.*

The author states that cycling should be stopped at a certain point and production finished by expansion if the maximum recovery of butanes-plus is to be realized. A guide to know when to stop cycling is provided.

J. D. Parent

Corrosion of Pipe Line

Hughes, T. W. THE CORROSION OF MAINS AND SERVICES. *Natl. Gas Bull.* (*Australia*) **11**, 23-29 (1947) *September-October.*

The nature of corrosion found in pipe lines buried in the soil, the environments which influence it both externally and internally, the materials usually used in pipe line and their relative resistance to corrosion, and a method of combating it are reviewed briefly.

S. Mori

LP-Gas Recovery

Craig, J. A. MAXIMUM RECOVERY OF

LIQUEFIED PETROLEUM GASES. *Petroleum Refiner* 27, 108-110 (1948) *January.*

While modern plants are designed for 75 to 95% recovery of propane, the design may not be easily adapted to existing plants. Greater recovery obviously is favored by a greater circulation rate, greater pressure, lower temperature and lower molecular weight. Efficient precooling of the oil, the use of an inter-cooler to counteract heat of solution, and the use of propane refrigeration rather than water cooling for pre-cooling of the oil are recommended. Some increase in pressure can be realized by decreasing friction by the use of properly sized pipe. Too low a molecular weight increases problems of separation and recovery in the still. Increased LP-gas recovery means increased recovery of methane and ethane. This is normally counteracted by flashing in one or two steps and either recycling the liberated gas or sending it to a reabsorber in order to cut down loss of C_3. Overhead from the main still may be recompressed before deethanizing so as to avoid loss of LP-gas. It is suggested that if the raw gasoline is pumped in with the recompressor discharge steam the ultimate effect is high pressure condensation. Mr. Bentley, in printed discussion of this paper, concurs with most of the statements and makes certain interesting remarks. Thus, he indicates that on flashing, steps of 50% reduction are most satisfactory.

J. D. Parent

LP-Gas Recovery

Pryor, C. C. CLEAR LAKE PLANT DESIGNED FOR PROPANE-GASOLINE PRODUCT. *Petroleum Refiner* 27, 87-90 (1948) *January.*

This is an exposition of the details of construction for a new gasoline plant. Design calls for recovery of 55% of the propane and 90% of the butane. The liquid product is 36000 gallons per day of 95 RVP gasoline which is about 32% propane, 38% butanes and 30% C_5.

J. D. Parent

Propane Plant

Titus, E. DUAL-PURPOSE PROPANE PLANT. *Gas* 24, 36-37 (1948) *January.*

Details of the Concord Gas Company's propane-air standby system reveal that bottle gas will be an additional service offered.

E. F. Davis

Secondary Recovery

Yuster, S. T. WATER-FLOOD SPACING. *Oil Gas J.* 46, 70-73, 75-76, 88-89 (1947) *December* 20; *World Oil* 127, 124-128, 131-132, 134 (1948) *January.*

The problem of determining optimum well spacing for secondary recovery by water flooding is discussed in considerable detail.

J. D. Parent

Transmission

Miller, B. GAS TRANSPORTATION SYSTEM CACULATIONS. PART III—NO. XIX IN A SERIES. *Gas Age* 100, 24-28 (1947) *December* 25.

In this first article of Part III covering "The Compression of Gas" the pressure-volume-temperature relationships for perfect gas and real gases are discussed in reference to the power requirements for compression. A simple approximate method is given for calculating the power required for compressing any gas, and

the exact formula for isothermal compression of a perfect gas is developed.

Author's abstract

Water Injection

Menzie, D. E. EFFECT OF WATER INJECTION IN GAS DRIVE. *Oil Gas J.* **46**, 78-80, 83, 85-86 (1948) *January* 22.

Laboratory tests were run to determine the effect on oil recovery of water injections during an air drive. It was found that under certain conditions increased oil recovery was realized together with a decrease in air required.

J. D. Parent

6. PETROLEUM AND SYNTHETIC LIQUID FUELS

Chemicals and Fuel from Petroleum and Coal

Garner, F. H. LIQUID FUELS AND CHEMICAL PRODUCTS FROM PETROLEUM AND COAL. *J. Inst. Petroleum* **33**, 678-686 (1947) *November.*

This paper was presented to Section 9, Chemistry in Relation to Fuel, Power & Transport, at the 11th International Congress of Pure and Applied Chemistry in London on July 18, 1947. The author discusses briefly the sources of liquid fuels for power generators and for heat generation. Three methods of preparing chemical products from hydrocarbons are reviewed briefly; these are, (1) those products separated or made without major alteration of the source material, (2) those built up from one of the simpler molecules, and (3) those derived from higher boiling products, that is from a group of hydrocarbons rather than the individual hydrocarbon used in the second method.

L. Ciboch

Chemicals from Hydrocol By-Products

Sullivan, F. W., Jr. FUEL SYNTHESIS BY-PRODUCTS AS A SOURCE OF CHEMICALS. *Chem. Eng. Progress* **43**, 13-17 (1947) *December.*

A discussion is given of the possible impact of the water soluble low molecular weight compounds obtained as by-products from the Hydrocol plants on existing production and markets. It is pointed out that ten Hydrocol plants would produce only 3% of present gasoline demands, but about 70% of present production of alcohols, aldehydes and aliphatic acids. The author feels that the greatest effect of this development will be on the manufacture of cellulose esters.

H. R. Batchelder

Cycloversion Process

Helmers, C. J. and Johnson, P. H. CYCLOVERSION PROCESS. *Oil Gas J.* **46**, 88, 90, 93, 107 (1947) *December* 13.

Pilot plant development work on the "Cycloversion" process for the past several years has been directed towards a study of the effects of pressure, catalyst and feed stock. Lower pressure (10 lbs./sq.in. gage) produced a more olefinic and higher octane gasoline. A more active form of Cyclocel catalyst produced a higher octane gasoline. Gas oil, gas oils and deasphalted crude were cracked by means of the process.

C. H. Riesz

Fischer-Tropsch Synthesis

Anderson, R. B., Hall, K. W., Harlan, H. and Seligman, B. STUDIES OF THE FISCHER-TROPSCH SYNTHESIS. II. PROPERTIES OF UNREDUCED COBALT CATALYSTS. *J. Am. Chem. Soc.* 69, 3114-3119 (1947) *December.*

Surface area and pore volume studies of unreduced precipitated cobalt Fischer-Tropsch catalysts are presented. The areas varied from the 60 to 150 sq. m./gram which were several times greater than those of the kieselguhrs used as carriers. Average pore diameters of granular catalysts varied from 500 to 770 Angstroms and were 2.5 to 3 times greater than those of pelleted catalysts. Pelleting also reduced surface areas 10 to 20%. It appeared that the "cobalt basic carbonate-promoter complex" was precipitated chiefly in the void space of the kieselguhr.

C. H. Riesz

Fischer-Tropsch Synthesis

Anderson, R. B., Krieg, A., Seligman, B. and O'Neill, W. E. FISCHER-TROPSCH SYNTHESIS: TESTS OF COBALT CATALYSTS AT ATMOSPHERIC PRESSURE. *Ind. Eng. Chem.* 39, 1548-1554 (1947) *December.*

Hydrocarbons were synthesized from carbon monoxide and hydrogen over a cobalt-magnesia-kieselguhr catalyst in laboratory testing units containing 50 cc. of catalyst. Pelleted catalysts produced more light hydrocarbons and carbon dioxide than granular catalysts. With flow rates and temperatures adjusted to the same conversion (70% contraction), the product distribution was not significantly different up to temperatures of 205°C. However, unsaturation of the liquid product increased with increases in temperature and flow (maximum bromine number of liquid product observed was 33). Overall activation energies of 24 to 27 kg.-cal. per mol were calculated from the results.

C. H. Riesz

Fluid Catalyst for Fischer-Tropsch Synthesis

Lee, J. A. ESSO'S FLUID CATALYST MODIFIES FISCHER-TROPSCH. *Chem. Eng.* 54, 105-107 (1947) *October.*

Use of fluid catalyst in the Fischer-Tropsch process has been studied in three pilot plants of the Standard Oil Development Company located at Baton Rouge. It has been estimated that a plant producing 8300 barrels per day of 80-octane gasoline and 1050 barrels per day of gas oil from natural gas would cost $35,000,000. With natural gas at 5 cents per M.c.f., the cost of gasoline is competitive with its production from petroleum at present market conditions.

C. H. Riesz

Hydrogenation

Gordon, K. THE MELCHETT LECTURE, 1947—HYDROGENATION IN THE FUEL AND CHEMICAL INDUSTRIES. *J. Inst. Fuel (British)* 21, 53-61 (1947) *December; Petroleum (British)* 10, 244-246, 262 (1947) *November-December,* 11, 16-17 (1948) *January.*

The utilization of hydrogenation and related processes in the fuel and chemical industries is broadly reviewed. The scope of the paper includes production of hydrogen, synthesis of ammonia and methanol, Fischer-Tropsch process, hydrogenation of coal and oils as well as related processes for manufacturing aviation gasoline.

C. H. Riesz

Kieselguhr Data

Anderson, R. B., McCartney, J. T., Hall, W. K. and Hofer, L. J. E. KIESELGUHRS: SUITABILITY AS CARRIERS IN CATALYSTS. *Ind. Eng. Chem.* **39**, 1618-1628 (1947) *December.*

The physical properties of a number of kieselguhrs have been studied. Data on chemical analysis, X-ray diffration, surface areas and pore volumes are tabulated. Electron micrographs at magnifications of 2000 and 20,000 diameters are also presented.

C. H. Riesz

Synthetic Liquid Fuel Production

Schroeder, W. C. SYNTHETIC LIQUID FUELS IN THE UNITED STATES. *Mech. Eng.* **69**, 989-995 (1947) *December.*

Establishment of a synthetic fuel industry to supply an appreciable fraction of the petroleum demand must be predicated upon availability of sites in which raw materials and water are available in adequate supply. The development of a synthetic fuel industry of 1-2 million barrels daily capacity is an undertaking which is 5-10 times the magnitude of the wartime synthetic rubber program. The Fischer-Tropsch process bases on natural gas and coal, coal hydrogenation and oil-shale extraction are discussed.

C. H. Riesz

T. C. C. Processing

Noll, N. D. and Luntz, D. M. T.C.C. PROCESSING OF PENNSYLVANIA GRADE CRUDE-OIL FRACTIONS. *Oil Gas J.* **46**, 81, 83, 90 (1948) *January* 15.

Gasoline yields and octane numbers obtainable by thermal and by T.C.C. processing are compared.

C. H. Riesz

Thermofor Unit

Eastwood, S. C., Hornberg, C. V. and Potas, A. E. THERMOFOR CATALYTIC CRACKING UNIT. *Ind. Eng. Chem.* **39**, 1685-1690 (1947) *December.*

A pilot unit for studying the Thermofor catalytic cracking process is described in detail. Maximum oil charge rate is 2 bbls./day; catalyst through-put rates up to 60 lbs./hr. can be employed at pressures up to 50 lbs./sq. in. gage and at temperatures up to 1100°F. Comparisons between commercial and pilot plant data are made.

C. H. Riesz

7. ANALYTICAL METHODS AND TESTS

Carbon Monoxide Determination

McCullough, J. D., Crane, R. A., Beckman, A. O. DETERMINATION OF CARBON MONOXIDE IN AIR BY USE OF RED MERCURIC OXIDE. *Anal. Chem.* **19**, 999 (1947) *December.*

A method is described for the determination of

carbon monoxide in air, which makes use of the reaction between CO and granular red mercuric oxide at a temperature of 175° to 200°C. The carbon monoxide is determined by the loss in weight of the reaction tube. The percentage error varies from about 1.2% to 0.3% for concentrations of carbon monoxide between 100 and 400 ppm. Hydrogen interferes with the accuracy of the results obtainable, but since it reacts only to the extent of 5% of its true concentration at 175°C., this temperature is advisable if hydrogen is present. Methane is unreactive at the temperatures given. Although the higher saturated hydrocarbons, unsaturated hydrocarbons and aromatics react, they may be effectively removed by an activated charcoal trap. A complete description of the apparatus and reagents used is given, and tables of analytical results on sample gases are included.

M. Nolt

Gas Analysis

Crawford, F. W. METHOD FOR ANALYZING GAS. *U. S. 2,427,261* (1947) *September* 9.

A method and apparatus for analyzing gaseous mixtures containing hydrocarbon vapors is described. This process was specifically designed for the quantitative determination of methane, ethane, and heavier hydrocarbons in soil gases, which are collected and analyzed in prospecting for petroleum beds. In conducting an analysis by this method, CO_2 and water vapor are absorbed from the gas sample, ethane and the heavier hydrocarbons are condensed by means of liquid nitrogen and the volume of methane present is determined by measurement of the CO_2 produced by its combustion in the presence of excess air. Ethane is then separated from the heavier hydrocarbons by distillation at the temperature of liquid oxygen and its volume determined by pressure measurement in a calibrated receiver. The heavier hydrocarbons are subsequently determined in a similar manner.

H. Hakewill

Moisture in Coal

Liplavk, L. I. RAPID METHOD OF MOISTURE DETERMINATION IN COALS BY HIGH FREQUENCY CURRENTS. *Engrs. Digest* 4, 576 (1947) *December;* from *Zavodskaya Laboratorija* No. 6, 1946, pp. 555-558.

The use of a high frequency field to provide heat in drying coal samples for moisture determination has the following advantages: (1) the temperature rise is almost instantaneous and simultaneous throughout the mass, (2) the interior of the mass becomes hotter than the surface because of the ambient air on the surface, and (3) since the temperature rise depends on the properties of the medium, the effect is selective. The size of the sample used is 5 grams and the procedure consumes 2 minutes yielding results having an accuracy equal to the distillation method which involves 2 hrs. time.

M. C. Miyaji

Moisture in Solid Fuels

Simek, B. G. and Ludmila, J. THE DETERMINATION OF MOISTURE IN SOLID FUELS. *Fuel (British)* 26, 132-137 (1947) *September-October.*

Methods for the determination of water in solid fuels are discussed. The xylene-distillation method and the direct determination by drying at 130°C. in a stream of nitrogen are found to be most suitable for the analysis of solid fuels. Procedures for both methods are fully described. The conventional method by drying in an oven at 105°C. is not suitable for all kinds of fuels, especially those which are easily oxidized.

M. C. Miyaji

Particle-Size Determination

Wiley, J. T., Deloney, J. E., and Denton, S. W.

ACCURATE PARTICLE-SIZE DETERMINATION OF FLUID CATALYSTS BY COORDINATION OF ROLLER ANALYSIS AND MICROSCOPIC EXAMINATION. *Petroleum Refiner* **26**, 90-93 (1947) *December.*

Modifications in the Roller Analyzer method for particle-size determinations are outlined and explained and details of an improved filter trap for the analyzer are described. The authors suggest that the particle fractions collected by air-elutriation be checked by a measuring microscope, and a close correlation of air flow with density be maintained. In this manner a reproducibility of ± 1.3 from the average is obtained.

B. Grimm

The following article, which has not been abstracted, is called to your attention:

FLOW CALORIMETER MEASURES SPECIFIC HEATS OF GASES. *Petroleum Engr.* **19**, 148 (1947) *December.*

8. GENERAL AND PHYSICAL CHEMISTRY

Alumina Transition

Cooke, P. W. and Haresnape, J. N. THE EFFECT OF STEAM ON SOME ALUMINA TRANSITIONS. *Trans. Faraday Soc.* (*British*) **43**, 395-398 (1947) *July.*

X-Ray studies indicate that the transformation of gamma alumina and of Boehmite, Al O (OH), to alpha alumina is not appreciable below 450°C. and steam pressures below 240 lbs. per sq. in. (14 hour exposure). Increase in temperature or pressure or both increases the rates of transformation and of the crystal growth of gamma alumina. It is suggested that steam acts as a catalyst for these transformations.

C. H. Riesz

Burning Velocity

Ranford, C. and Pease, R. N. THEORY OF BURNING VELOCITY. II. THE SQUARE ROOT LAW FOR BURNING VELOCITY. *J. Chem. Phys.* **15**, 861-865 (1947) *December.*

An equation is developed for the burning velocity of a gas, based on the forward diffusion of active particles from the flame front into the unburnt gases. The burning velocity is proportional to the square root of a function which is essentially the sum of the concentration of the active atoms or free radicals, each concentration being "weighted" in terms of its rate of diffusion into the cold gas. Very good agreement between the calculated and experimental values of burning velocities for carbon monoxide and hydrogen are reported.

S. Katz

Carbon, Oxygen, Steam Reactions

Parent, J. D. and Katz, S. CARBON, OXYGEN AND STEAM REACTIONS STUDIED. *Am. Gas Assoc. Monthly* **30**, 21-24 (1948) *January.*

The paper presents a summary of theoretical and experimental studies of the reactions of carbon and steam, and carbon, oxygen and steam. Equilibrium concentrations of the gaseous products of the reactions have been calculated over a pressure range of 1 to 100 atmospheres and between temperatures of 900° to 1750°K. (1160° to 2690°F.). A description of

experimental studies of the reactions is given and the direction of future work is indicated.

S. Katz

Explosibility of Acetylene

Jones, G. W., Kennedy, R. E. and Spolan, I. EFFECT OF HYDROCARBONS AND OTHER GASES UPON THE EXPLOSIBILITY OF ACETYLENE. *U. S. Bureau Mines Report of Investigations* 4196 (1948) *January.*

Pure acetylene is potentially explosive at pressures as low as 5.7 psi gauge. The safe pressure range may be extended by "stabilizing" acetylene with other gases. The present paper describes experimental studies on the stabilizing effects of hydrogen, helium, nitrogen, carbon dioxide, natural gas, propane and butane. The last two are the most effective, the addition of 21% butane raising the explosive pressure to 100 psi. Reference is made to comparable work in Germany. The possibility of using the acetylene-propane or acetylene-butane reaction for the production of carbon black is considered briefly.

S. Katz

Heats of Vaporization

Osborne, N. S. and Ginnings, D. C. MEASUREMENTS OF HEAT OF VAPORIZATION AND HEAT CAPACITY OF A NUMBER OF HYDROCARBONS. *J. Research Natl. Bur. Standards* 39, 453-477 (1947) *November.*

A precision calorimeter for the determination of heat of vaporization and heat capacity is described in detail. The instrument was used to measure the heats of vaporization of 59 hydrocarbons at 25°C., including 35 paraffins, 3 alkylcyclopentanes, 10 alkylcyclohexanes and 11 alkylbenzenes, and the heat capacities of twelve paraffin hydrocarbons between 5° and 45°C.

S. Katz

Ignition of Gas Mixtures

Blanc, W. V., Guest, P. G., Von Elbe, G. V. and Lewis, B. IGNITION OF EXPLOSIVE GAS MIXTURES BY ELECTRIC SPARKS. I. MINIMUM IGNITION ENERGIES AND QUENCHING DISTANCES OF MIXTURES OF METHANE, OXYGEN AND INERT GASES; *J. Chem. Phys.* 15, 798-802 (1947) *November.* Lewis, B and Von Elbe, G. II. THEORY OF THE PROPAGATION OF FLAME FROM AN INSTANTANEOUS POINT SOURCE OF IGNITION. ibid 803-808.

Results of experimental work to determine minimum energy requirements of sparks to ignite various gaseous mixtures show that electrode gap, electrode voltage and mixture composition are the primary factors involved. A theory is proposed for a method of calculating the minimum spark energy requirements.

E. F. Davis

Ignition of Gases and Vapors

Hoerl, A. E. IGNITION OF GASES AND VAPORS BY SPARKS. *Gas* 23, 60, 63 (1947) *December.*

A series of controlled experiments indicated that frictional or impact sparks will not ignite gasoline vapor or natural gas under normal field conditions. Some variables governing ignition are discussed.

S. Katz

Infra-Red Absorption Bands

Thorndike, A. M. THE EXPERIMENTAL DETERMINATION OF THE INTENSITIES OF INFRA-RED ABSORPTION BANDS. III.

CARBON DIOXIDE, METHANE AND ETHANE. *J. Chem. Physics* **15**, 868-874 (1947) *December.*

The absolute intensities of the principal infrared absorption bands of carbon dioxide, methane and ethane have been determined experimentally. Moderately good agreement with the results obtained by other workers were obtained.

S. Katz

Paraffin Hydrocarbon Data

Wiener, H. CORRELATION OF HEATS OF ISOMERIZATION AND DIFFERENCES IN HEATS OF VAPORIZATION OF ISOMERS AMONG THE PARAFFIN HYDROCARBONS. *J. Am. Chem. Soc.* **69**, 2636-2638 (1947) *November.*

The author defines two structural parameters, the polarity number and the path number. A method for calculating heats of isomerization and heats of vaporization of branched chain hydrocarbons, employing these quantities, is described, and is applied to the determination of these quantities for the 33 C_5 to C_8 paraffin hydrocarbons. The results are shown to be in good agreement with previously published data. The paper also predicts the corresponding data for 35 nonanes, for which no experimental values are available. The parameters are also used to relate heats of vaporization and isomerization with the boiling points.

S. Katz

Prism Spectrometry

Pyler, E. K. PRISM SPECTROMETRY FROM 24 TO 37 MICRONS. *J. Chem. Phys.* **15**, 885-886 (1947) *December.*

Prism spectroscopy in the infrared region from 24 to 37 microns by means of a thallium bromide-iodide prism is described. The prism shows very low dispersion in the rock salt region (2-15 microns). Thin films of polystyrene and polyethylene show high transmission in this region and may be of value as coatings and windows.

S. Katz

Producer Gas Manufacture

Prettre, M. and Magat, M. A KINETIC THEORY FOR AIR PRODUCER GAS FORMATION. *J. Inst. Fuel (British)* **21**, 35-43 (1947) *October.*

The paper presents a mathematical treatment of producer gas manufacture, based on some current theories on the kinetics of combustion and reduction reactions of carbon. The resulting differential equation is solved by a series of approximations for assigned sets of parameters. Numerical results for CO yield and maximum temperatures are in good agreement with industrial values. The influences of gas velocity, thermal insulation, and depth of the fuel bed are related to the producer's operation.

S. Katz

Properties and Structure of Cyclohexane Derivatives

Beckett, C. W., Pitzer, K. S. and Spitzer, R. THE THERMODYNAMIC PROPERTIES AND MOLECULAR STRUCTURE OF CYCLOHEXANE, METHYLCYCLOHEXANE, ETHYLCYCLOHEXANE AND THE SEVEN DIMETHYLCYCLOHEXANES. *J. Am. Chem. Soc.* **69**, 2488-2495 (1947) *October.*

The structures of cyclohexane, methyl and ethylcyclohexanes and the seven dimethylcyclohexanes were analyzed from physical measurements and thermal data and the data were used

to compute their heat capacities, entropies and heats and free energy functions from 298.16°K. to 1500°K.

S. Katz

Sedimentation Velocity

Needham, L. W. and Hill, N. W. THE SETTLING OF MINERAL PARTICLES IN WATER. *Fuel* **26**, 101-111 (1947) *July-August.*

This paper presents some new experimental data on the velocity of sedimentation in water of coal particles for a wide range of sizes and describes methods of expressing this and similar data of previous workers in simple dimensionless quantities. A procedure is given for the comparison of irregular particles with the classical deviations for spherical particles. The discussion is extended to include hindered settling by means of empirical corrections.

S. Katz

Vapor Pressures of Hydrocarbons

Griswold, J. and Brooks, W. B. HIGH RANGE VAPOR PRESSURES AND ANTOINE EQUATION CONSTANTS OF SOME C_3 TO C_5 HYDROCARBONS. *Petroleum Refiner* **26**, 122-127 (1947) *December.*

Literature values for the vapor pressures of some C_3 to C_5 hydrocarbons have been correlated, using Antoine equation constants, and are presented in graphical and tabular form. The hydrocarbons include propane, propene, isobutane, isobutene, 1-butene, 1, 3-butadiene, butane, trans-2-butene, cis-2-butene, isopentane and n-pentane.

S. Katz

9. ORGANIC CHEMISTRY

Oxidation of Methane

Boomer, E. H. and Naldrett, S. N. THE OXIDATION OF METHANE AT HIGH PRESSURES. *Can. J. Research (Section B)* **25**, 494-501 (1947) *November.*

Methane and oxygen in a volumetric ratio of about 15 to 1 and at pressures of 2500 to 3000 lbs./sq.in. was passed over catalysts of copper, silver, zinc, nickel and Monel. Reaction temperature was 932°F. The carbon oxidized was 3.3 to 4.5% of that contained in the entering methane. The liquid condensate formed was largely water. Under the best conditions with a massive copper catalyst, 31% of the condensate was methanol. Formaldehyde and formic acid were formed in small amounts.

C. H. Riesz

10. CHEMICAL ENGINEERING

Adsorption

Hirschler, A. E. and Amon, S. ADSORPTION: A TOOL IN THE PREPARATION OF HIGH-PURITY SATURATED HYDROCARBONS. *Ind. Eng. Chem.* **39**, 1585-1596 (1947) *December.*

It has been found that isomeric saturated hydrocarbons can be separated by fractional ad-

sorption on charcoal or silica gel, but not on alumina. Isomeric unsaturated hydrocarbons can likewise be separated.

J. D. Parent

Dimensionless Groups

Klinkenberg, A. and Mooy, H. H. DIMENSIONLESS GROUPS IN FLUID FRICTION, HEAT AND MATERIAL TRANSFER. *Chem. Eng. Progress* 44, 17-35 (1948) *January.*

This is a review of the concept of dimensionless groups and should prove valuable to senior and graduate engineering students.

J. D. Parent

Evacuation of Vacuum Systems

Dryer, W. P. ROUGH EVACUATION OF VACUUM SYSTEMS. *Chem. Eng.* 54, 122-124 (1947) *December.*

This article is concerned primarily with evacuation of systems. A guide is provided for predicting when viscous flow predominates and for when molecular flow predominates. Illustrative examples are given for the calculation of pipe size and evacuation time.

J. D. Parent

Fluidization

Kite, R. P. and Roberts, E. J. FLUIDIZATION IN NON-CATALYTIC OPERATIONS. *Chem. Eng.* 54, 112-115 (1947) *December.*

Application of the fluid technique to certain roasting operations such as the calcining of limestone is described. Stagewise operation is included in the discussion.

J. D. Parent

Heat Transfer

Kilham, J. K. ENERGY TRANSFER FROM FLAME GASES TO SOLIDS. *Gas World (British)* 127, 804-805 (1947) *December* 6. *Gas Times (British)* 53, 373-374, 376 (1947) *December* 19.

This is a progress report on the Duckham research fellowship and is concerned with the mechanism of heat transfer from flame gases to solids. It has been found that forced convection provides the major means of transfer.

J. D. Parent

Heterogenous Catalysis

Bosworth, R. C. L. CHEMICAL SIMILARITY IN HETEROGENEOUS CATALYSIS. *Trans. Faraday Soc. (British)* 43, 399-406 (1947) *July.*

The factors in scaling a chemical process from laboratory to pilot plant to industrial size are treated mathematically. In heterogeneous catalytic reactions, the five similarity conditions of Damkohler, Z. *Elecktrochem.*, 42, 846 (1936), are satisfied if both the catalyst grain size and activity are allowed to vary. Special conditions where conduction or radiation provide the predominant mode heat transfer permit prediction of output rates.

C. H. Riesz

High Pressure Reactions

Clark, E. L., Golden, P. L., Whitehouse, A. M. and Storch, H. H. HIGH PRESSURE REACTIONS . . . *Ind. Eng. Chem.* 39, 1555-1564 (1947) *December.*

The authors discuss in detail the equipment and

techniques developed in the course of the investigation of the hydrogenation of coal, at the Central Experiment Station of the U.S. Bureau of Mines in Pittsburgh, Pennsylvania. Specialized equipment has been found necessary to handle the high pressure (1000 to 12,000 pounds per square inch gage) and high temperature (350° to 600°C.) requirements of the process, along with the corrosive and erosive nature of the products. Materials of construction, vessel closures, internal liners, piping joints, valves, control instruments, and some operating techniques are described in detail. Flow sheets are presented for a semi continuous hydrogenation unit, a powdered reagent feeder, and a small pilot plant.

W. K. Zahray

Liquid-Liquid and Vapor-Liquid Extraction

Knox, W. T., Jr., Weeks, R. L., Hibshman, H. J. and McAteer, J. H. LIQUID-LIQUID AND VAPOR-LIQUID EXTRACTION. *Ind. Eng. Chem.* **39**, 1573-1581 (1947) *December.*

Operating techniques and laboratory glass equipment used in the study of vapor-liquid extraction, countercurrent stage and tower equipment for liquid-liquid extraction, and countercurrent tower equipment for continuous vapor-liquid extraction are described in detail. Gage glass equipment used for studying phase equilibria at pressures up to 1000 pounds per square inch, and a maximum temperature of 300°F. is described. Typical data obtained with some of the equipment are also presented.

W. K. Zahray

Pressure Drop

Speers, J. A. INFLUENCE OF PACKING DENSITY IN PURIFIERS ON RESISTANCE TO GAS FLOW. *Gas J. (British)* **252**, 636-637 (1947) *December* 17.

The author tested the drop in pressure due to friction which attended the passage of gas through a 2 ft. column of oxide in a vessel two inches in diameter. Tests were run at varying moisture contents of the oxide and the loss was found to decrease up ot the point where pores become saturated. This is ascribed to reduction in surface area and roughness.

J. D. Parent

Thermodynamics

Edmister, W. C. APPLICATIONS OF THERMODYNAMICS TO HYDROCARBON PROCESSING. PART V. *Petroleum Refiner* **26**, 110-117 (1947) *November.*

The thermodynamics of a number of the auxiliary fluids related to petroleum processing are discussed. These include steam, air, ammonia, sulfur dioxide and carbon dioxide. The use of Mollier diagrams is discussed for each gas, and the computation of adiabatic work of compression using perfect gas laws with gamma values derived from these diagrams is described.

S. Katz

Edmister, W. C. APPLICATIONS OF THERMODYNAMICS TO HYDROCARBON PROCESSING. PART VI. *Petroleum Refiner* **26**, 112-118 (1947) *December.*

Part six in this series recapitulates the earlier chapters in the form of a series of exercises which are solved in detail. A development of the equations for the non-isothermal flow of compressible fluids is also given.

S. Katz

Vapor Phase Reactions

Henriques, H. J. EVALUATION OF VAPOR PHASE REACTIONS WITH SOLID CATALYSTS. *Ind. Eng. Chem.* 39, 1564-1570 (1947) *December.*

A detailed description is presented of apparatus found suitable for the experimental study of vapor-phase reactions over solid catalysts in a flow system, with pressures ranging from 1 to 50 atmospheres, and at elevated temperatures. Flow, pressure, temperature measurement and control, and the metering of product gases are discussed relative to the small apparatus found useful in bench scale studies of catalytic reactions.

W. K. Zahray

11. PROCESS EQUIPMENT AND INSTRUMENTATION

Automatic Control on Pipe-Line

Batchelder, C. D. and Rockwell, R. A. AUTOMATIC CONTROL ON PORTLAND-MONTREAL LINE. *Petroleum Engr.* 19, 94, 96, 98, 100, 102, 104, 106 (1947) *December.*

See *Gas Abstracts* 3, 214 (1947) *December* for abstract.

Control Valve Selection

Nolte, C. B. GIVE THE CONTROL VALVE A CHANCE! *Oil Gas J.* 46, 52-53, 55 (1948) *January* 1.

A nomograph is presented in this article for use in selecting control valves. This nomograph, built around the fundamental equations governing control-valve behavior under varying flow rates, interrelates friction in the valve, change in flow and change in valve loading. Some of the terms, not defined in the present article, have been discussed in another presentation on the subject which appeared under the same title in the *Oil Gas J.* of November 29, 1947 page 65.

J. J. First

De-Ethanizers

Hutchinson, A. J. L. CONTROL AND OPERATION OF DE-ETHANIZERS. *Petroleum Processing* 2, 792, 794-795 (1947) *October.*

Close control of a de-ethanizer in the production of propane from natural and refinery gases is obtained by several means. Propane losses are held to a minimum by maintaining a constant temperature at reflux condenser and returning all reflux to the column. Temperature at reflux, however, must be held above point where ethane will be forced into the bottoms product. Control of reboiler temperature is required to remove all propane possible from bottoms. Constant heat input to reboiler will then automatically result in correct amount of reflux and bottom temperature. The minimum amount of heat to introduce can be determined by changing heat input to reboiler with a constant feed quantity and degree of vaporization at the feed tray, and observing the reboiler temperature. Degree of feed vaporization, to prevent overloading the bottom of the tower, is best controlled by flow rate rather than temperature. Smooth de-ethanizer operation is secured through efficient layout and design, and selection of proper pumps for reflux.

J. J. First

Fittings for Mixing Vessels

Bissell, E. S., Hesse, H. C., Everett, H. J. and

Rushton, J. H. DESIGN AND UTILIZATION OF INTERNAL FITTINGS FOR MIXING VESSELS. *Chem. Eng. Progress "Trans. Section"* 43, 649-658 (1947) *December.*

The best current practice is presented in this paper for design, location and utilization of tank fittings inside of mixing vessels, such as baffles, coils, draft tubes, spargers or feed pipes, compartmentation septums and steady bearing supports. Illustration and design tables are given.

J. J. First

Gas Compressor Controls

Kastrop, J. E. ELECTRIC WATCHDOGS FOR SMALL GAS COMPRESSOR. *World Oil* 127, 162-164, 167-168 (1947) *December.*

A description is given of a small compressor plant used in gas-lift operations and its mechanical and electrical safeguards by means of which maintenance and repair expenses have been minimized. Operating costs are kept at a minimum by reducing the required attention to a few hours per day although the variable conditions under which the compressor operates require 100% supervision made possible only by the electrical and mechanical devices limiting these conditions.

J. J. First

Heat Exchangers

Thornton, D. P., Jr. AIR COOLED HEAT EXCHANGERS. *Petroleum Processing* 2, 775, 777-778 (1947) *October.*

Advantages of air for cooling process fluids include elimination of most normal water supply problems such as corrosion, tower cleanouts, repairs and chemical treatment. Maintenance is reported to be one-third that of water-type exchangers. Disadvantages are that method is not economical for low temperatures, and that the equipment and operating costs range from 25 to 150% higher. Variable-pitch propellors permit adjustment of air stream to seasonal requirements. Dual-speed electric drive, or variable-speed drive by steam-turbine or internal-combustion engines, allow savings in power during cool weather. Natural gasoline plant operators, in many instances, prefer air cooling for primary still overhead product, debutanizer overhead, steam condensing, and engine jacket water. Economics are doubtful for de-ethanizer or depropanizer overhead condenser. An interesting refinery installation was for cooling a fluid from 1500 to 250°F. with 90°F. air where temperature of discharge air from cooler was 300°F. Costs are given for a number of representative installations.

J. J. First

Heat Pump

Johnson, W. E. ECONOMIC AND TECHNICAL ASPECTS OF THE HEAT PUMP. *Heating, Piping & Air Conditioning* 19, 119-126 (1947) *December.*

The author discusses some of the aspects of marketing the heat pump for industrial or domestic use. Most important is the economic aspect about which the author quotes some rather peculiar fuel costs.

E. F. Davis

12. MATERIALS OF CONSTRUCTION

Corrosion

Munger, C. C. CORROSION CONTROL IN

MID CONTINENT PRODUCTION. *World Oil* 127, 172, 174, 176, 178 (1947) *December.*

The corrosive effect of H_2S and salt water solutions found in oil crudes, and their reaction mechanisms is described in this article. Two types of plastic lining, phenolic and vinyl resins, are recommended against corrosion in the oil well equipment. The presence of paraffin may also cause trouble by collecting in the cooler zones of the tubing casing and sucker rods.

S. Mori

Refractories

McCreight, D. O. PERMEABILITY DATA ON AMERICAN REFRACTORIES. *Ind. Heating* 14, 1734, 1736, 1738, 1740 (1947) *October.*

A procedure whereby the permeability of air through different refractory bricks can be compared has been worked out. As yet the results obtained are not applicable to furnace problems; however, they may prove enlightening upon the importance of permeability in blast furnace and open hearth fire bricks.

S. Mori

13. NEW BOOKS

Gas Statistics

American Gas Association. GAS FACTS. New York, American Gas Association, 1947.

This is the first edition of the statistical year book to be published by the Bureau of Statistics of the American Gas Association annually. The years 1945 and 1946 are reviewed. The text is composed primarily of tables presenting data on energy reserves, production, transmission and distribution, sales and utilization, finance, labor, prices, and time series by gas types.

L. Ciboch

Inventions

Berle, Alf K. and DeCamp, L. Sprague. INVENTIONS AND THEIR MANAGEMENT. 2d ed. Scranton, Pa., International Textbook Co., 1947.

The authors state that the object of this book is to present in a single volume the principles and practices governing the technical, legal, and business procedures of invention. Among the subjects discussed are the patent laws, patentability of inventions, preparation of patent applications, prosecution of patent applications, sale of the patent, infringement, copyrights and trademarks, and accounting and taxes in relation to patents. Sample patents are included as well as a very useful glossary of words and phrases which have special meanings in invention and patenting.

L. Ciboch

Nomography

Douglass, Raymond D. and Adams, Douglas P. ELEMENTS OF NOMOGRAPHY. New York, McGraw-Hill, 1947.

The authors present an elementary text defining six "types" of diagram. Some practical aids discussed are the systematic adjustment of sale measurements to the base line of the diagram, the regular use of prepared forms, and the practice of checking solutions; also discussed are many difficulties strictly pertinent to scale work. A large number of completed diagrams have been included.

L. Ciboch

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Transactions of the Faraday Society
U.S. Bureau of Mines Bulletins, Information Circulars, Reports of Investigations and Technical Papers